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(71) Applicant *(for AL, AM, AT, AZ, BA, BE, BF, BG, BJ, BR, BY, CF, CG, CH, CI, CM, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, FR, GA, GE, GN, GQ, GR, GW, HR, HU, ID, IS, IT, JP, KG, KM, KP, KR, KZ, LR, LT, LU, LV, MA, MC, MD, MG, MK, ML, MR, MX, MZ, NE, NI, NL, NO, PH, PL, PT, RO, RU, SE, SI, SK, SM, SN, SY, TD, TG, TJ, TM, TN, TR, UA, UZ, VN, YU only)*: **UNILEVER N.V.** [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).

(71) Applicant *(for AE, AG, AU, BB, BW, BZ, CA, CY, EG, GB, GD, GH, GM, IE, IL, KE, LC, LK, LS, MN, MW, NA, NG, NZ, OM, PG, SC, SD, SG, SL, SZ, TT, TZ, UG, VC, ZA, ZM, ZW only)*: **UNILEVER PLC** [GB/GB]; Unilever House, Blackfriars, London, Greater London EC4P 4BQ (GB).

(71) Applicant *(for IN only)*: **HINDUSTAN LEVER LIMITED** [IN/IN]; Hindustan Lever House, 165/166 Backbay Reclamation Maharashtra, Mumbai 400 020 (IN).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **VAN GASTEL, Hubertus, C,** [NL/NL]; Unilever R & D Vlaardingen, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL).

(74) Agent: **KAN, Jacob, H**; Unilever Intellectual Property Group, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL).

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(54) Title: MOISTURE BARRIER

(57) Abstract: An edible barrier comprising a first layer of a soft spreadable fat blend to fill up the pores in the food product covered by a second layer of high-melting fatty barrier material, said second layer having a thickness of about 2 to 1,000 micrometer, effectively reduces migration of moisture in porous food products.

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MOISTURE BARRIER

FIELD OF THE INVENTION

The invention relates to an improved, edible, lipid-based, moisture barrier for food products. More particularly, it relates to an edible moisture barrier which is useful in preventing moisture migration within multi-component food products, especially if comprising porous food products such as bread.

BACKGROUND OF THE INVENTION

In many food products, moisture migration during storage can seriously compromise the appearance, quality, stability, organoleptic properties such as taste and freshness, shelf life and consumer satisfaction in general.

Maintenance of moisture levels is then essential in order to maintain acceptable organoleptic properties, quality, and taste. In addition, many chemical and enzymatic deteriorative reactions proceed at rates partially governed by the moisture content of foods. Excessive rates of these reactions can promote deleterious changes in the flavour, colour, texture, and nutritive value of food products.

The problem is especially pronounced in multi-component snack-type food products, particularly those having components with different moisture contents and water activities (e.g., pre-packaged cheese and crackers or pre-packaged bagel and cheese cream products), moisture can migrate between adjacent components, altering the component's characteristics and organoleptic properties. Another example of such a food product is a sandwich with peanut butter.

In addition to compromising the quality of finished food products, moisture migration can hinder production and distribution of food products. Thus, for example, the cheese in a cheese/cracker product could dry out while, at the same time, the cracker losses its crispness.

In order to prevent such moisture migration, it has been proposed to use edible barrier materials. One method to prevent moisture migration in foods involves coating one or more surfaces of the food product with an edible moisture barrier. Such barriers should have a low moisture permeability in order to prevent the migration of water between areas of differing water activities. In addition, the barrier should cover the food surface completely, including crevices, and adhere well to the food product surface. The moisture barrier should be sufficiently strong, soft, and flexible to form a continuous surface that will not crack upon handling, yet can be easily penetrated during consumption. In addition, the barrier film's organoleptic properties of taste, aftertaste, and mouthfeel should be imperceptible so that the consumer is not aware of the barrier when the food product is consumed. Finally, the moisture barrier should be easy to manufacture and easy to use.

Because lipids, such as oils, fats, and waxes, are composed of lipophilic water insoluble molecules capable of forming a water impervious structure, they have been investigated for use in moisture barrier films.

With respect to oleaginous materials derived from lipids (i.e., sucrose polyesters, acetylated monoglycerides and the like) and/or other film forming lipids, it has been shown that, unless an undesirably thick coating is used, the barrier is not sufficiently effective for food products requiring long

shelf life. Such film forming lipids tend to become unstable under normal, practical use condition and loss film integrity and barrier effectiveness. In addition to structural instability, such as oiling out or cracking upon handling or with changes in temperatures, such lipid-based moisture barriers may have the disadvantage of being organoleptically unacceptable, because they may have a greasy or waxy mouthfeel.

Accordingly, many of the barriers in the art use a water-impermeable lipid in association with hydrocolloids or polysaccharides such as alginate, pectin, carrageenan, cellulose derivatives, starch, starch hydrolysates, and/or gelatine to form gel structures or cross-linked semi- rigid matrixes to entrap and/or immobilize the nonaqueous or lipid material. In many cases these components are formed as bilayer films.

Such bi-layer films may be precast and applied to a food surface as a self-supporting film with the lipid layer oriented toward the component with highest water activity. See, for example, US-A-4 671 963, US-A-4 880 646, U-A-4 915 971 and US-A-5 130 151

There are, however, a number of drawbacks associated with such moisture barriers. The hydrocolloids themselves are hydrophilic and/or water-soluble and thus tend to absorb water with time. The absorption of water by the hydrophilic material in moisture barrier is greatly accelerated while the film is directly in contact with foods having a water activity (Aw) above 0.75. In addition, some hydrocolloids tend to make the barriers fairly stiff, requiring the addition of a hydrophilic plasticizer (e.g., polyol) to increase flexibility. These plasticizers are often strong moisture binder themselves thus

promoting moisture migration into the barriers and decreased structural stability and effectiveness of the barriers. Furthermore, the texture and the required thickness of some of these barriers may make their presence perceptible and objectionable when the product is consumed. Additional processing steps (casting and drying) required to form these films make them difficult to use in high speed commercial production.

US-A-20040101601 discloses an edible moisture barrier in the form of a composition that includes a micro-particulated high melting lipid having a melting point of about 70°C or higher as fat crystal control agent and a low melting triglyceride blend with specific solid fat content having a melting point of about 35°C at targeted storage temperature of the food products moisture barrier.

Currently available edible moisture barrier technology is not suitable for effectively stopping moisture migration in composite food products during shelf life. Lipid material based moisture barriers lack physical strength and flexibility and cannot withstand elevated temperatures during processing. Hydrocolloid-based edible films potentially have better tensile strength, but are not very effective because of their hydrophilic nature. Upon drying, hydrocolloid films tend to become rather brittle and hence lose their superior physical properties. Combinations of hydrocolloid and lipid films have been applied in alternating layers (laminate) to take advantage of both systems, but require complex and expensive processing.

Thus, there is still a need for alternative or improved edible barriers suitable for use in food products.

It is therefore an object of the invention to provide an edible barrier suitable for use in food porous products, which does not have one or more of the above mentioned drawbacks.

It has now surprisingly been found that the above object of the invention may be achieved by the edible barrier of the invention, which is especially suitable for use in porous food products, comprising a first layer of a soft spreadable fat blend to fill up the pores in the food product covered by a second layer of high-melting fatty barrier material, said second layer having a thickness of about 2 to 1,000 micrometer.

DEFINITION OF THE INVENTION

According to a first aspect of the invention, there is provided an edible moisture barrier comprising a first layer of a soft spreadable fat blend to fill up the pores in the food product covered by a second layer of high-melting fatty barrier material, said second layer having a thickness of about 2 to 1,000 micrometer.

According to a second aspect of the invention, there is provided a composite food product comprising parts having different water activities (Aw), separated by the edible barrier according to the invention.

According to a third aspect of the invention, there is provided a process for the preparation of a food product, using the moisture barrier of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The edible barrier according to the present invention comprises a first layer of a soft spreadable fat blend to fill up the pores in the porous food product. Suitable fat blends are fat spreads which are soft at ambient temperature, i.e. temperatures of 5°C up to 25°. Such fat spreads are well known in the art. Examples are oil-continuous spreads containing about 70% fat, which are spreadable at temperatures of 5°C up to 25°C and having a solid content in fat blend at 10°C of 10-30% and having a solid content in fat blend at 20°C of 5-20%. The material may further include taste and colouring agents as used in common fat spreads.

As a second element, the barrier of the invention comprises a layer of high-melting fatty barrier material, said second layer having a thickness of about 2 to 1,000 micrometer. The high-melting fatty barrier material has a melting point of at least 30°C, preferably at least 35° or even 40°C. Suitable materials can be mono- di- and/or triglycerides, waxes and mixtures thereof. An especially suitable material was found to be Grindsted barrier 1000 (ex Dansico). This material is a mixture of bee wax and acetic acid esters of monoglycerides.

The barrier according to the invention is prepared by heating the material forming the second layer above its melting point and then spraying it onto the first layer, where it cools and solidifies. The heat of the material forming the second layer causes part of the first layer to melt and mix with the warm material forming the second layer. After cooling down, the material forming the second layer solidifies and forms the second layer, which is strongly bonded to the first layer. The thickness of the second depends of the amount which is sprayed on and should be between about 2 to 1,000 micrometer, preferably between about 10 to 400 micrometer, more preferably

between about 50 to 200 micrometer. The complete barrier effectively prevents migration of moisture from one part of a food product to another part.

It was found that when the second layer is used without the first layer, the porous surface is not properly sealed and no effective moisture barrier is formed. Similarly, if one uses the first layer in isolation, the moisture barrier properties are unsatisfactory.

As used herein, "water activity" (Aw) is the ratio of vapour pressure of water in the food of interest and vapour pressure of pure water at the same temperature.

Food products wherein the barrier may suitably be used are preferably selected from the group consisting of moisture leaking (ingredients such as vegetables (tomato, salad), fruit, bread, fish and meat. Exceptional benefit was achieved when using peanut butter on sandwiches. The format of the ingredient can range from native to pulp, dried gelled etc.

The barrier of the present invention may further comprises optional ingredients such as protein, salt, flavour, anti-microbials, components, colorants, emulsifiers, acidifying agents, (co)-oxidants such as hydrogen peroxide, and the like.

The invention will be further illustrated in the following non-limiting examples.

Example 1

Peanut butter sandwich

The peanut butter sandwich is an example of a pre-packed sandwich with a proposed (chilled) shelf life up to one week. The sandwich consists of two bread layers with peanut butter in between. The sides of the bread that come in contact with the peanut butter have been treated with the barrier system according to the present invention.

Materials:

- White Casino type of Bread
- Peanut butter (regular, about 57% fat content))
- Oil continuous spread (70% fat, spreadable at temperatures of 5°C up to 25°, solid content in fat blend at 10°C=20%, solid content in fat blend at 20°C=11%).
- Lipid based moisture barrier (Danisco Grindsted barrier 1000 system, melting point ± 43°C). Application temperature for this example is 60°C.
- Spraying equipment with temperature control (minimal 60°C working temperature)
- Flow pack equipment.

Process and assembly:

- Frozen white Casino bread is defrosted in the original packaging.
- The loafs of bread are then covered with about 5 to 7 grams of the oil continuous spread on one side only. The spread is spread out homogeneously with a knife or similar device, covering the complete loaf and thereby filling all the pores of the crumb.
- The Grindsted barrier 1000 material is now sprayed over the spread. A thin layer of about 200µm is applied by spraying the material with an air assisted spray nozzle operating at 60°C.

The droplet size is adjusted such that it just does not cause a mist.

- The barrier layer is allowed to crystallise and thereby fix to the under laying spread. This will take up to 10 seconds. The fully stabilised system has a dull appearance and feels like a dry film.

- The peanut butter (20 up to 30 grams) is added to one of the loafs and spread out. Care is taken here not to damage the barrier layers.

- The sandwich is completed by putting another barrier treated loaf of bread onto the peanut butter side of the first loaf.

- The now complete sandwich is then packed by a flow pack device and stored.

After storage at 5°C for 8 days, the taste, mouthfeel and appearance of the peanut butter sandwich were still excellent. The bread did not show any significant drying out and the peanut butter did not show discoloration, which indicate that the barrier effectively prevented moisture migration from the bread to the peanut butter.

CLAIMS

1. Edible barrier for use in porous food products, comprising a first layer of a soft spreadable fat blend to fill up the pores in the food product covered by a second layer of high-melting fatty barrier material, said second layer having a thickness of about 2 to 1,000 micrometer.

2. Barrier according to claim 1, wherein the first layer is a fat-continuous fat blend.

3. Barrier according to any preceding claim, wherein the fat-continuos fat blend comprises 0-70% water.

4. Barrier according to any preceding claim, wherein the fat-continuous fat blend consists of triglycerides.

5. Barrier according to any preceding claim, wherein the high-melting fatty barrier material comprises esters of monoglycerides.

6. Barrier according to claim 5, wherein the ester is an acetic acid ester.

7. Barrier according to any one of the preceding claims, wherein the second layer has a thickness of about 10 to 400 micrometer.

8. Barrier according to claim 7, wherein the second layer has a thickness of about 50 to 200 micrometer.

9. Composite food product comprising parts having different water activities (Aw), separated by the barrier according to any one of the preceding claims.

10. Food product comprising an edible barrier according to claims 1-9, separating a bread part and a food ingredient selected from the group consisting of vegetables, fruit, fish and peanut butter.

11. Process for the preparation of a food product in the form of a snack, comprising the steps of covering a porous food product with a first layer of a soft spreadable fat blend to fill up the pores in the porous food product, spraying a high-melting fatty barrier material upon the first layer at a temperature above the melting point of the high-melting fatty barrier material, allowing the high-melting material to cool to form a second layer having a thickness of about 2 to 1,000 micrometer and adding other food ingredients.

12. Process according to claim 11, wherein the porous foodstuff is bread, biscuit toast.

13. Process according to claim 12, wherein the other food ingredient is peanut butter and a peanut butter bread snack is prepared.

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INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A21D13/00 A23D9/00 A23L1/00 A23G9/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A21D A23L A23G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 87/03453 A (WISCONSIN ALUMNI RES FOUND) 18 June 1987 (1987-06-18) page 3, line 29 - page 4, line 29 page 5, line 18 - page 6, line 28 page 7, lines 14-18 page 10, lines 3-25 page 11, lines 3-16 claims 1,6,10,11,21	1-3,7,9, 10
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Piret-Viprey, E

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 3 186 852 A (BAKER WILLIAM H) 1 June 1965 (1965-06-01) column 3, lines 20-70 column 4, lines 31-41 column 4, line 70 - column 5, line 5 column 5, lines 17-25 claim 1	1-5,9,11
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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